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The Death of Lady Shaw

ALL readers of the *Meteorological Magazine* will have heard with extreme regret of the death of Lady Shaw, and will desire to express to Sir Napier Shaw their sincere sympathy in the loss which has befallen him. Lady Shaw's health had not been satisfactory for some months past, but it was not realised by her friends that the end was so near. She passed away at Manchester after a brief period of serious illness within a few days of Sir Napier's return from Utrecht, where he had presided over the International Meteorological Conference, to which we refer elsewhere.

In Lady Shaw the staff of the Meteorological Office had a sincere friend who was ever willing to help in any enterprise calculated to bring them together and to foster the spirit of *esprit de corps*. Many an individual also has reason to remember, with gratitude, her friendship and sympathy in times of trouble. On such occasions she was ever ready to give unstintingly of her time and energy. But her interest in Meteorologists and their doings extended beyond the range of the Office staff. The social gatherings connected with international and other meetings held in London in recent years owed much of their success to the care with which Lady Shaw thought out the arrangements and to her skill as a hostess. She had thus many friends among the meteorologists of all countries. Many will remember with pleasure the beautiful photographs of clouds and other phenomena which she showed at such gatherings.

We cannot in this magazine dwell on the many other sides of

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Lady Shaw's activities. She was keenly interested in all educational work. The war forced on all thinking people the need for cultivating the sense of citizenship, and in the last few years Lady Shaw threw herself with characteristic energy into the difficult problem of giving practical shape to that ideal. She was Secretary of the Citizenship Committee of the British Association.

A memorial service was held on September 27th at St. Peter's Church, Cranley Gardens, simultaneously with the funeral service at All Saint's Church, Habergham, near Burnley, and was attended by many friends.

Meeting of the International Meteorological Conference at Utrecht.

SINCE the first steps were taken in 1853 towards international co-operation in meteorology the International Meteorological Organization has had a varied career, its meetings sometimes taking the form of congresses of plenipotentiaries appointed by Governments and convened through diplomatic channels and sometimes of conferences of directors of meteorological services and observatories meeting without official aid. Until 1919 the Organization had no written constitution, but at the first Conference held after the war, at Paris, in 1919, " Réglement de l'organisation météorologique internationale " was formally adopted. According to these rules the International Meteorological Organisation comprises: (1) Conferences of Directors; (2) The International Meteorological Committee; (3) Commissions.

The Conferences are to meet every six years and to consist of " all heads of réseaux of stations in each country and the Directors of Meteorological Observatories which are official and independent of one another," to whom are added a number of Directors of private institutes and representatives of Meteorological Societies.

The International Meteorological Committee is appointed by each Conference to act until the meeting of the next Conference, and is to all intents and purposes the executive body of the Conference, for it carries out the decisions of the past Conference and prepares the business of the next. Each member of the Committee must belong to a separate country and must be the Director of an independent meteorological establishment.

Commissions are appointed by the Committee " to advance the study of special questions," and members are appointed simply from the point of view of their personal qualifications to

assist the work of the Commission. In this way the assistance of scientists and private gentlemen unassociated with official services is made available and freely used.

When the Conference met in Paris, in 1919, the political state of the world was so abnormal that invitations could not be sent to some countries, and many other countries were not able to be represented. It was therefore felt that another Conference should be called as soon as conditions became more favourable and all countries, without exception, could meet in council. When the International Meteorological Committee met in London, in 1921, it was considered that such a time was rapidly approaching and the invitation of Professor van Everdingen, the Director of the De Bilt Observatory, Holland, for a meeting of the Conference in Utrecht during 1923 was accepted. The return to normal political relationship has not been so rapid as was expected, and the troubles of the early months of 1923 made it look at one time as if the Conference would have to be postponed, but it was finally decided not to cancel the invitations which had been despatched in December, 1922, and this course has been justified by the successful meetings of the Conference, held in Utrecht, from September 7th to 14th.

The meetings of the Conference were preceded and followed by meetings of several Commissions. The Commissions for Agricultural Meteorology, Solar Radiation, Terrestrial Magnetism and Atmospheric Electricity, Weather Telegraphy and Maritime Meteorology, were held before the Conference (September 3rd—6th), and the Commission for the Study of Clouds and the Commission for the Upper Air met after the Conference (September 14th). For the meetings of the Commissions and Conference fifty members were present, from Argentine (1), Austria (1), Belgium (2), Brazil (1), Denmark (1), Spain (2), Finland (1), France (5), Great Britain (5), India (1), Japan (4), Norway (3), Holland (11), Poland (2), Portugal (1), Russia (2), Sweden (3), Switzerland (2), Czecho-Slovakia (2).

At the first meeting of the Conference on Friday, September 7th, Sir Napier Shaw (Great Britain) was elected President and Dr. Hesselberg (Norway) Secretary-General. After the President's address had been delivered and certain business matters disposed of it was decided to remit all reports and resolutions submitted to the Conference to five sub-commissions for preliminary consideration and the preparation of suitable recommendations. This distribution occupied the greater part of the meeting on Friday afternoon, when the Conference adjourned until the following Tuesday to give the commissions time to prepare their reports. When the Conference re-assembled on Tuesday it worked very hard for three days, considering the sixty odd resolutions submitted for its approval.

The great development of the use of wireless telegraphy in the dissemination of meteorological data has necessitated very intricate co-operation between meteorological services all over the world, expecially in Europe. As the information is distributed broadcast for the use of anyone who cares to receive it, it is highly desirable that the messages issued in the various countries should be of the same form and in the same code. As the result of untiring work of the Weather Telegraphy Commission, under the guidance of its energetic President, Lieut-Colonel Gold, the New International Code is used by twenty-two meteorological services. The arrangement of the times of issue of the wireless messages to prevent interference is also a difficult matter and necessitates close co-operation. It is not surprising, therefore, that twenty resolutions were submitted to the Conference by the Weather Telegraphy Commission. These dealt with such questions as the wording and interpretation of the code, times of issue, description of the stations, reduction of pressure to sea level, additional observations and the establishment of sub-commissions to watch the working of the code and to study proposals for improvements. A new departure was the agreement to add a new group of figures to certain messages to allow experiments to be made of a new method of forecasting based on a close study of cloud forms which has recently been developed by the French Meteorological Office. It was very gratifying that it was not found necessary to alter the International Code, for it is extremely difficult to carry through a change when so many services are concerned, and it would jeopardise all the progress made towards the use of a uniform message if changes were made by some and not by others.

The resolutions submitted by the Commission for Maritime Meteorology were less numerous, but they contained references to several remarkable advances towards the extension of synoptic methods to ships at sea. The Commission recommended the adoption of a code to be used for wireless weather messages sent out from ships. The code consists of eight groups of figures, the first four of which are called universal groups and will be the same for all ships in all parts of the world; the second four, called national groups, will be different according to the office which organises the issue and will be designed to meet the different needs of the various services. This proposal, which was accepted by the Conference, marks a great advance in international co-operation in all parts of the world. The Conference also recorded its appreciation of the work performed on board the "Jacques Cartier." This is a French ship which has made experiments during voyages between America and Europe of collecting meteorological information by wireless telegraphy from ships and shore, preparing a meteorological

chart of the Atlantic and then broadcasting forecasts for the use of ships. The " Jacques Cartier " carries an officer of the mercantile marine, trained in the French Meteorological Office, who is assisted by a clerk lent by that Office. Further developments along these lines are to be expected.

The power of the method of " correlation " when applied to meteorological data is now generally recognised by meteorologists. The success of Dr. G. T. Walker, who employs this method in his forecasts of the Indian monsoon, is well known. Such work, however, fails unless homogeneous data, extending over a long period, are available. Professor Exner of Vienna brought this matter before the Conference, and a resolution was adopted expressing the opinion that the publication of long and homogeneous data from a number of stations at distances of about 500 or 1,000 kilometres from one another would be of great value. Not content with expressing this opinion the Conference asked Dr. G. T. Walker to supervise the working of the resolution so far as Asia is concerned, and similarly Professor F. M. Exner for Europe, Mr. H. H. Clayton for America and Dr. G. C. Simpson for Africa, Australia and the ocean generally.

The Conference was unable to solve the problem submitted to it by the Commission for the Upper Air regarding the international publication of upper air data. That these data should be collected and published in a uniform manner is highly desirable, but all the efforts of Sir Napier Shaw, the President of the Commission, to find a possible way of doing so have been unavailing. Such an undertaking would be expensive and would require financial aid from all countries concerned. In present circumstances it is not surprising that such aid is not forthcoming and all the Conference could do was to make suggestions for meeting temporarily the pressing need for the rapid circulation of results obtained by means of sounding balloons. The data obtained by the use of aeroplanes and pilot balloons are too numerous to be handled internationally at present, and the Conference therefore recommended that each country should publish its own data.

Many resolutions dealing with Agricultural Meteorology, Terrestrial Magnetism, Atmospheric Electricity, Solar Radiation and the Upper Atmosphere were adopted, but space does not allow of further details here.

One of the most important questions dealt with by the Conference was its relationship to the International Union of Geodesy and Geophysics. The great growth of the official weather services of all civilised countries has provided so many questions of administration and organisation for international consideration that this side of the activities of the International Meteorological Organization has swamped the scientific side. At recent meetings

of the Conference and Committee there has been no time for scientific discussion, and therefore little to attract the members of the Organization other than those connected with the great official meteorological services. A resolution was therefore considered to alter the rules in such a way as to limit membership of the Conference to directors of meteorological services. There was practically no opposition and the rule governing the membership of the Conference now reads as follows:

> "The Officers of the Committee shall invite to the "Conference all heads of Réseaux of stations in each "country which are official (d'état) and independent of one "another."

It was generally understood that this would remove from the work of the Organization all questions of pure science and that the science of meteorology would be considered only in so far as it is applied to the needs of the meteorological services. Practically this is no change in the work of the Organization, but it makes a clear distinction between the sphere of the International Union of Geodesy and Geophysics and the sphere of the International Meteorological Organization. There should now be no material overlap between the work of the Union which considers meteorology from the scientific side and the work of the Organization which "studies only those questions which are of interest to all national meteorological services and which necessitate the utilisation of their own network of stations."

At the last meeting of the Conference when the new International Meteorological Committee had been elected and Sir Napier Shaw was about to terminate his long connection with international meteorology, Colonel Delcambre, the head of the French Meteorological Office, rose, and in a short, eloquent speech expressed the regard every member of the Conference felt for Sir Napier Shaw and the debt which meteorology owed to him. He then proposed that Sir Napier should be elected an honorary member of the International Meteorological Committee, an honour never before bestowed. The proposal was accepted with prolonged applause and much feeling, for all felt that this was a happy way of marking their appreciation of the great work done by Sir Napier Shaw for international meteorology.

The newly elected Committee met the next day and appointed Professor van Everdingen, President, and Dr. Hesselberg, Secretary. The office of Vice-President was left vacant for the present.

The general feeling at the end of the meetings, frequently expressed, was that good work had been done and much progress made. Good feeling between members from all countries was very marked throughout.

Meteorology, etc. at the British Association Meeting, Liverpool, 1923.

A SUBJECT to which increasing attention is being devoted is that of the meteorological effects on sea-level and tides. The magnitude of these effects is sufficient to render their prediction a matter of practical importance, and an important paper was contributed to Section A this year by Dr. A. T. Doodson. It appears that the atmospheric pressure distribution may, by its statical effect and by the operation of the resulting wind, affect the sea-level at Liverpool by the amount of three feet or even more. The fluctuations of sea-level at Liverpool have been correlated with the local atmospheric pressure and with its gradients east and north, and a linear relationship has been established representing the greater part of the meteorological effect. The maximum correlation with the atmospheric pressure is obtained when the sea-level is taken three hours earlier than the pressure, but the effect of the east pressure gradient (south wind) is greatest 15 hours later, while maximum correlation with north-gradient (east wind) is given by simultaneous readings of sea-level and pressure gradient. Two other interesting results contained in the paper are that, for a given pressure gradient, winds in the Atlantic are about 50 per cent. more effective than winds in the Irish Sea, in raising sea-level at Liverpool, and that a west wind raises sea-level on the British coasts of the North Sea though this wind is blowing away from the land. The effect is probably due to west winds blowing over a large area north of Scotland.

"The energy of the circulation of the Earth's atmosphere" was the title of a paper contributed by Capt. D. Brunt. This paper, which was unfortunately read only by title, in the absence of the author, contained some interesting particulars. The total kinetic energy of the general circulation of the earth's atmosphere is estimated as of the order of $3 \cdot 10^{27}$ ergs. An estimate of the kinetic energy of a cyclone which developed over the North Sea between July 27th and August 3rd, 1917, has been given by Sir Napier Shaw as $1 \cdot 5 \times 10^{24}$ ergs, and this represents an addition of 50 per cent., over the area covered by the cyclone, to the average kinetic energy of the general circulation, supposed uniformly distributed over the earth's surface. Considerations of the dissipation of kinetic energy by turbulence lead to the following estimates of the average rates per square metre of the earth's surface: layer from ground to 1 km., 3 watts; layer from 1 km. to 10 km., 2 watts; total 5 watts. If this rate of dissipation were maintained the kinetic energy would be used up in twenty-eight hours. To maintain the general circu-

lation, a little over 2 per cent. of the effective incoming energy of solar radiation must be converted into kinetic energy.

Reference was made to the magnetic disturbance of March 24th, 1923, in a paper by the Rev. A. L. Cortie on "Series in Magnetic Disturbances." This is the greatest disturbance since the exceptional storm of May, 1921, and is a member of a series from January 30th to June 13th, at a mean interval of 27·2 days. This series is noteworthy because the sun has been almost entirely free from spots and bright faculæ since the beginning of the year. It is a continuation of a long series with similar interval beginning October 27th, 1921, and has been associated with a small spot in a region of the sun which has been intermittently disturbed for a similar long period. Complete accord has been established between the series of solar and magnetic disturbances, and the conclusion is drawn that a definite region of the sun can affect the earth magnetically even when there are no visible disturbances upon it.

Reports were again presented by the Committee to assist work on Tides and the Committee for Seismological Investigations, and both Committees were re-appointed, the former with a new constitution. The report of the Tide Committee shows that besides the investigation of meteorological effects, important progress has been made in investigating the effects of friction, due mainly to the retarding effect of the sea bottom. An interesting point in the seismological report is that examination of a long series of Italian records has confirmed a period of about 21 m., detected in Jamaica earthquakes and mentioned in last year's report. Three new periods have also come to light—4 years, 15 months and 6 months.

No report was presented by the Committee for the Investigation of the Upper Atmosphere, but the Committee was re-appointed, with the addition to its members of Mr. L. H. G. Dines.

The official demonstration of forecasting was again given on the lines described in the reports in this Magazine of the previous meetings of the Association in Hull and Edinburgh; but this year, instead of forming an isolated exhibit, it was incorporated as part of the "Scientific Exhibition,"* organised for the first time in connection with a British Association Meeting. This was an exhibition of apparatus and diagrams, representative of many branches of science, open for a fortnight both to members of the Association and of the general public, and was an unqualified success. The Meteorological Office exhibit, to which a representative collection of meteorological instruments was added this year, occupied a prominent position in the entrance

* See *Nature*, July 22nd, 1923.

hall of the Central Technical Schools, where the Exhibition was held, and was a very popular feature. Amongst the items which attracted special attention were a record of the recent earthquake in Japan, and the anemogram for the period of the gale of August 29th-30th, both taken at Bidston Observatory, Liverpool, and lent by the Director, Mr. W. E. Plummer. Valuable voluntary assistance in connection with the routine work of the local daily weather service, which formed part of the exhibit, was rendered by three students of the Geography School of the University of Liverpool, Messrs. Fitzgerald, Darbishire and Smith. Some interesting atmospheric pollution diagrams were lent by Dr. J. R. Ashworth of Rochdale.

The "Scientific Exhibition" also contained an exhibit of anemometers by R. W. Munro, Ltd., and a miscellaneous exhibit by Negretti and Zambra, Ltd., but there was no undue duplication of instruments shown by the Meteorological Office. Special mention may be made of a new barograph of special construction shown by Negretti and Zambra, designed for survey work. The instrument has a very open scale, 1 inch of barometric pressure equalling 4 inches on the chart, and it may be reset to any standard barometric reading between 25″ and 31″ of mercury. Compensation for temperature is embodied, and as this is varied when the instrument is set to any different reading, the temperature errors for a change of 40° C. at any pressure are very minute.

Another feature of the Liverpool meeting was a Soirée at the University, on the lines of the Royal Society Soirées. A demonstration of atmospheric dust was contributed by Dr. J. S. Owens, while Mr. L. H. G. Dines demonstrated the working up of meteorograph records of upper air temperature, and the use of the special meteorographs which have been designed for determining the height of ground fogs. An exhibition of meteorological instruments by Casella, Ltd., was also a feature of the Soirée.

On Friday, September 14th, a ballon-sonde was released from the University grounds by Mr. L. H. G. Dines, before a gathering of nearly one hundred people. It was hoped that the meteorograph might be received back in time for the record to be worked up at the University Soirée, but this was, unfortunately, not the case. It has, however, been returned since.

The "Meteorological Luncheon" was again held, the gathering being as is usually the case, a geophysical rather than a meteorological one. The party, which numbered 38, assembled at the North-Western Hotel, Lime Street. Prof. H. H. Turner presided, and after the luncheon there were interesting speeches from Dr. M. Newbiggin, Prof. Proudman, Mr. L. F. Richardson, Prof. Lindemann, Mr. J. J. Shaw, Sir Richard Gregory and Mr. W. E. Plummer. Others present included Mr. W. Andrews,

Mr. and Miss Bellamy, Dr. H. Borns, Mr. L. H. G. Dines, Dr. and Mrs. Doodson, Mr. N. Edge, Miss R. M. Fleming, Mr. M. A. Giblett, Maj. A. H. R. Goldie, Mr. W. Hall, Dr. E. P. Harrison, Dr. W. Harwood, Mr. G. R. Hay, Capt. H. F. Jackson, Dr. H. Jeffreys, Mr. and Mrs. Kinvig, Lt.-Com. G. ff. H. Lloyd, R.N.R., Mr. W. G. Mitchell, Mr. H. Montgomery, Dr. J. S. Owens, Sir J. Petavel, Dr. H. C. Plummer, Mrs. Proudman, Rev. J. P. Rowland, Mrs. and Miss Turner and Miss L. Winchester.

M.A.G.

OFFICIAL NOTICE

The following changes are announced as from June 11th, 1923. Mr. F. J. W. Whipple, Superintendent of the Climatology Division, succeeds the late Mr. M. de Carle S. Salter as Superintendent of the British Rainfall Organization. Mr. R. Corless, Superintendent of the Instruments Division, becomes Superintendent of the Climatology Division, while Captain F. Entwistle, Assistant Superintendent of the Local Centres Division, is promoted Superintendent of the Instruments Division. Mr. Whipple becomes sole Editor of the *Meteorological Magazine*.

Correspondence

To the Editor, *The Meteorological Magazine*

The "Prime"

In Bacon's essay "Of Vicissitude of Things" there occurs the following passage:—

> "There is a toy which I have heard, and I would not have it given over but waited upon a little. They say it is observed in the Low Countries (I know not in what part) that every five and thirty years the same kind and suit of years and weathers comes about again, as great frosts, great wet, great droughts, warm winters, summers with little heat, and the like, and they call it the 'Prime.' It is a thing I do the rather mention because, computing backwards, I have found some concurrence."

It is interesting to note that the period of the "Prime" is the same as that of Bruckner's cycle.

Cicely M. Botley.

10, *Wellington Road, Hastings, September 19th*, 1923.

A Halo Complex, August 20th 1923

SOME interesting halo phenomena were observed at Draycott, Staffs., on August 20th, at 16h. 30m., G.M.T. The sky was rapidly being covered with cirrus cloud when two bows of brilliant rainbow colours appeared above the sun. Blue, green, yellow and red were very bright, the red being nearest the sun. No traces of the halos were seen, the upper bow was apparently an arc of upper contact to the halo of 46°, and the lower to that of the halo of 22°. In the latter one end was bent upwards, and the other end downwards. At 16h. 32m. a brilliant mock sun also appeared. The whole phenomena only lasted 10 minutes, rain setting in steadily at 17h.

GRAHAM C. LAWSON.

Mayfield House, Nr. Ashbourne, Derbyshire. August 23rd, 1923.

[At the time in question the elevation of the sun must have been about 23°. With this elevation the upper arc of contact of the 22° halo is curved like a pair of ram's horns. Presumably, Mr. Lawson observed one " horn " and at the same time a small part of the 22° halo itself. The complex is remarkable, as the circumzenithal arc and the mock sun indicate the presence of prisms with vertical axes, whilst the upper arc of contact of the 22° halo implies prisms with horizontal axes in that part of the atmosphere, and an absence there of the random crystals which were responsible for the 22° halo.—ED. *M.M.*]

Obituary

Dr. John Allen Harker, F.R.S., O.B.E.—Dr. J. A. Harker, who died at Highgate on October 10th after a short illness, was a physicist and chemist with a wide range of interests. He came into touch with meteorologists as a young man when, in 1897, he undertook, on behalf of the Kew Observatory Committee, the comparison of the scales of thermometers; his work, carried out partly at Kew and partly at Sèvres, put platinum thermometry on a sound basis. When Kew Observatory was made the nucleus of the National Physical Laboratory, Dr. Harker became principal assistant in the Physical Department.

Some years later, in 1913, he undertook temporarily the office of Superintendent of Eskdalemuir Observatory. Since the war, in which his scientific knowledge and experience were largely used by the Government, Dr. Harker had established a successful practice as a consultant, and was engaged on such work as the utilization of the power available at the great Nile barrage. The country can ill afford the loss of men of such ability and initiative.

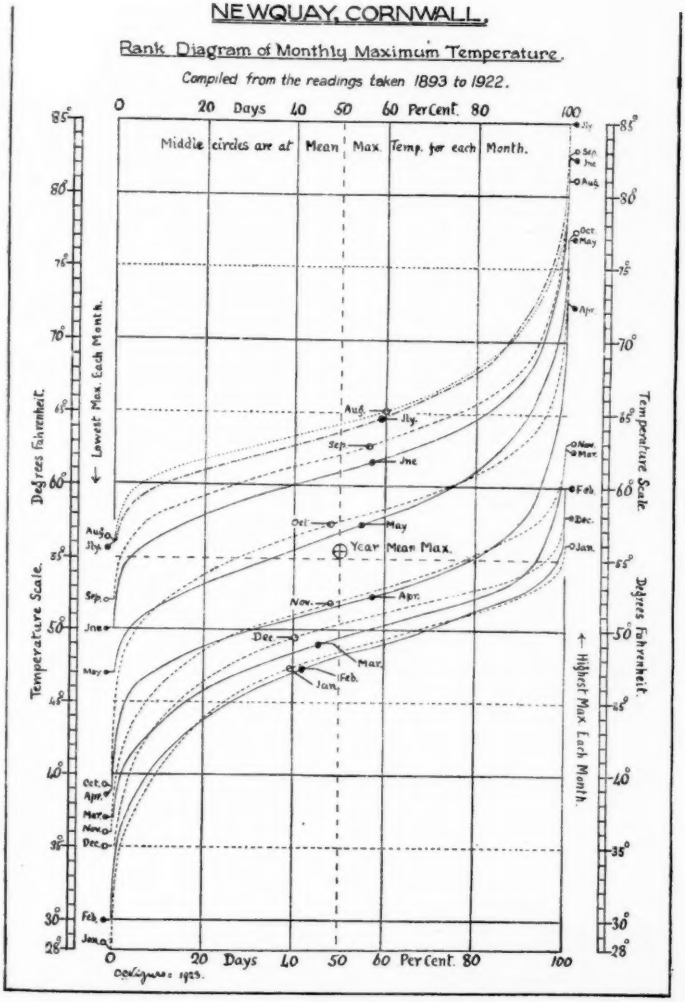
NOTES AND QUERIES

The Distribution of Maximum Temperatures at Newquay

It is a commonplace amongst students of weather that "normal" or "average" weather is very rare, and that the right way to obtain a grasp of the subject is to consider the frequency of deviations from the average of various amounts. The reduction of the observations to an appropriate form, though interesting, is somewhat laborious, and it has not been done very extensively. Dr. Vigurs, of Newquay, has studied the distribution of maximum temperatures at that place, and has been so good as to prepare the diagram* which is reproduced here. It is proposed to call such a diagram a "rank-diagram": the name is suggested by a row of soldiers arranged in order of height, the shortest on the left, the tallest on the right. Here we have represented by the top curve 100 typical August temperatures, the lowest on the left, the highest on the right. It will be seen, for example, that 20 per cent. of August days have maximum temperature below 61·7° F., 40 per cent. below 63·5° F., 60 below 65·0° F., 80 below 68·2° F. The lowest and highest maxima on record for the month are 56° and 81° respectively. The average maximum is 65·0° F., but the median (shown on the 50 per cent. line) is 64·3° F.

The diagram illustrates the characteristics of the ocean climate of Newquay, which lies on the north side of Cornwall, about 38 miles from Land's End. The seasons are very late—August being hotter than July, February colder than January—but a glance at the diagram shows that the very hottest days are in July and the very coldest in January. The ordinary October days are warmer than those of May, but May has some days hotter than any in October, and October some colder than any in May. There is a similar relation between November and April. These characteristics are determined, of course, by the slowness with which the temperature of the ocean changes. They may be summed up roughly by the statement that the ocean temperature governs the upper limit of air temperature

* The method adopted was as follows: The number of days of each maximum temperature for each month were added up, making for 30 years a total of 930 days for each month with 31 days. To April, June, September and November, 30 days were added proportionately to the number of days at the various degrees of temperature, and to February 90 days in a similar manner. The days were then plotted out on squared paper at the various temperatures at a scale of 6·2 ins. = 930 days, and the curves drawn with a minimum amount of smoothing. The 6·2 ins. was then halved for 50 (per cent. or days) and divided into 5 columns of 1·24 ins. for 20, 40, 60, 80 (per cent. or days) thus saving much computation.


NEWQUAY, CORNWALL.
Rank Diagram of Monthly Maximum Temperature.
Compiled from the readings taken 1893 to 1922.
Middle circles are at Mean Max. Temp. for each Month.
0 20 Days 40 50 60 Per Cent. 80 100
Degrees Fahrenheit.
Temperature Scale.
← Lowest Max. Each Month.
← Highest Max. Each Month.
Year Mean Max.
Aug. Jly. Sep. Jne. Oct. May Nov. Apr. Dec. Mar. Jan. Feb.
Copyright 1923.

in winter and the lower limit in summer. The average value of the daily maximum temperature for each month is indicated on the diagram. May and October have the same average, but in May the maximum temperature is below the average on 56 days in 100 : in October on 48 days in 100. It is significant that the months divide themselves into two groups, February to July, and August to January. In the former group the proportion of days with temperature below the average is higher than in the latter.

Special interest attaches to the highest and lowest temperatures recorded at the station. Dr. Vigurs gives the following particulars :—

The highest temperature on record, 85° F., occurred at Newquay on July 13th, 1921. There was a long spell of hot weather during the month, and on the day in question, the general flow of air across Cornwall was from the south-east, so that the sea influence must have been almost eliminated. The coldest days in the period covered by the Newquay observations were January 4th, 1894, and January 23rd, 1907. The weather maps for those days (reproduced in handy form in the *Weekly Weather Report*) show a remarkable resemblance. In each case there was an anticyclone over Europe, with very low temperatures in Russia, −27° F. being reported at Moscow on the former date, and −22° F. at Riga on the latter. In both instances the cold air reached Newquay from the south-east. There are only eight " ice-days " (maximum temperature below 32° F.) in the series of observations.

An interesting sequence of readings occurred at Newquay in 1895, the maximum temperatures for September 21st to October 1st being 83, 79, 79, 79, 77 and 77. These present a striking contrast to the Falmouth entries,* 68, 70, 69, 60, 67 and 67. The Newquay figures are supported by the reports from the North Devon stations and from Bristol, and appear to be authentic. They are the more remarkable in that only two readings above 78 are credited to August.

Gordon Bennett Balloon Race, September 23rd, 1923.

THE Gordon Bennett Balloon Race, which started this year from Brussels on the afternoon of September 23rd, will be remembered for the tragic destruction by lightning of three of the competing balloons, involving the death of five of the six aeronauts flying

* Hourly Means 1895, Table xii.

in them, and a few notes on the meteorological aspects of the race may be of interest. Extensive meteorological arrangements were made by the Institut Royal Météorologique, Brussels, as a result of which each competitor received during the morning a photographic copy of the weather chart of north-west Europe, and with it charts showing the wind at various levels, constructed from pilot balloon observations made over a wide area in the early morning. A forecast of general weather conditions for the current and succeeding day was also provided, and in the early afternoon a later set of upper wind charts was issued, giving conditions about noon. Arrangements were also made for the issue of later reports by wireless during the evening, both by slow Morse and by telephony, and a number of balloons carried receiving apparatus.

Owing to the control which the aeronaut is able to exercise over the altitude of the balloon, by the ejection of ballast, the meteorological factor is very important, and the meteorological situation is closely studied by most competitors. The balloon which descends on land, at the greatest distance from the starting point, is counted the winning balloon. The duration of the flight is not taken into account, but in planning the flight it is necessary to choose such altitudes as will give as rapid progress as possible on account of progressive loss of ballast and gas. At the same time the distribution of land and sea must be taken into consideration as a descent in the sea, apart from the danger, disqualifies the balloon. These remarks will serve to show how interesting may be the problems which present themselves on such occasions.

The writer was present unofficially this year in Brussels with one of the British competitors, Sq.-Leader Baldwin, pilot of "Banshee III.", and discussed with him the meteorological situation, on the basis of the information supplied by the Belgian Institute and of cables received from the Meteorological Office, London. It was hoped that advantage might be taken of a strong wind current between 3,000 and 6,000 feet for the first twelve hours to Denmark, and that, crossing to Sweden by a short sea route, strong southerly or south-westerly winds might then be found at a greater height, such being suggested by the horizontal temperature distribution. Conditions were unsettled, however, and of the fifteen balloons, all of which left in succession between 3 and 4.30 p.m. (G.M.T.) in showery weather, only two, both Belgian, succeeded in reaching Sweden, the early landing of most of the balloons, apart from those struck by lightning, being accounted for by the sheer weight of rain and snow which fell on them. The winning balloon landed 1,100 kilometres from Brussels after nineteen hours' flight. From accounts in the Belgian press it appears that the early part of the flight was round

about 8,000 feet. Higher levels were obtained later, and at 20,000 feet oxygen was taken. The second balloon, which landed 100 kilometres short of the first, seems to have proceeded much on the lines contemplated by Sq.-Leader Baldwin, who, however, was less fortunate, and was beaten down by rain and snow.

It is important to emphasize that the disastrous results of this year's race are not to be attributed to lack of meteorological information or to faulty meteorological advice. The forecast issued by the Belgian Meteorological Institute was received by all competitors, and conveyed a warning of showers and thundery squalls, while conditions were actually showery at the time of the start. The regulations state, however, that the race shall commence at the prearranged time irrespective of weather conditions. Of course, it is open to any competitor to withdraw, but in view of the international and sporting character of the event and the long and careful preparation necessary, the temptation to " chance it " whatever the weather, is necessarily very strong.

A miniature " Gordon-Bennett " was arranged for onlookers, and very large numbers of toy balloons were released with addressed postcards attached for their return if found. It is to be hoped that the Institut Royal Météorologique, Brussels, will be able to obtain and publish the results, which should be of great interest.

M. A. GIBLETT.

A Cloud Spiral

THE accompanying photograph illustrates an unusual cirrus cloud formation which was observed at Shoreham-by-Sea during the afternoon of July 14th last. It will be seen that the cloud shows a very definite spiral structure about an axis apparently nearly vertical. At the time the picture was taken (14h. 10m. G.M.T.) the cloud was in the south-west, with its base about 15 degrees, and its top about 45 degrees, above the horizon. It occupied this position without much change for an hour or more. Subsequently the cloud spread gradually over the sky towards north-east, apparently as the result of the growth of the low part of the spiral, the whole taking on an appearance like that of a fan with a twist in it.

The photograph suggests a combination of ascensional and anti-clockwise rotatory motion, that is to say, a cyclonic whirl on a small scale. It must be observed, however, that if the cloud were really formed in this way the upward component velocity must have been of the same order of magnitude as the horizontal components in order to give such a steep " pitch " to the screw

Cirrus Spiral, observed at Shoreham-by-Sea, July 14th, 1923.

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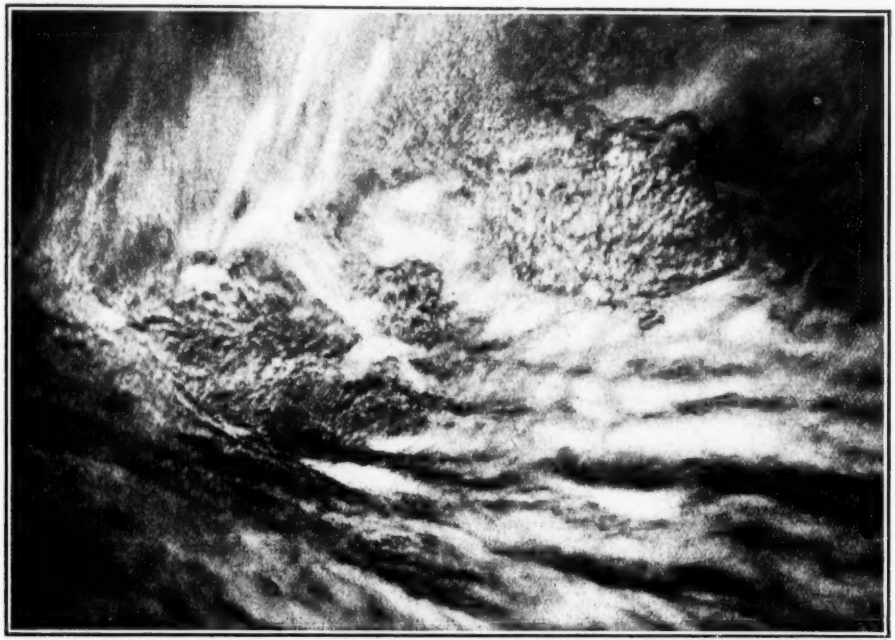

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CIRRO-CUMULUS, OBSERVED AT ABERDEEN, NOVEMBER 28TH, 1922.

in the lower part of the picture. No rotatory motion was, however, actually observed.

A reference to the synoptic charts showed that on the day in question the British Isles were in a region of almost uniform pressure between anticyclones over the North Sea and the Azores. There was a tendency for the formation of small shallow depressions, and slight rain or showers fell at many stations. Thunder occurred locally in the Midlands. Surface temperature exceeded 80°F. in the south of England, and at mid-day the dew point was above 60°F. at all the southern stations. It was therefore a day favourable for the exhibition of convectional phenomena. The curious thing about the whirl in the photograph is that it was confined to the cirrus regions. There was no low cloud that could be associated with the phenomenon.

E.G.B.

Note on Cirro-Cumulus Cloud of November 28th, 1922

THE photograph shows a rather curious development that occurred in a sheet of cirro-stratus cloud which was under observation at Aberdeen at 12h. 15m. on November 28th, 1922. The patch of cirro-stratus formed rather rapidly almost in the zenith, and was divided up by several "lanes" of clear sky, which were orientated along the direction of the cloud's movement, which was from west-north-west. The "speed-height-ratio" of the cloud was 2·8 milliradians per second, so that on the assumption of a height of 4 miles for the cloud, the speed must have been about 40 miles per hour. The cloud itself showed much change of form, evaporation and condensation taking place rapidly and simultaneously in different portions of the sheet. At the time the photograph was taken these changes were of an unusual character. Several small areas in the cloud-sheet became separated from the main mass by a narrow clear-cut "boundary line" of blue sky, and, within this boundary, the stratiform character of the cloud was suddenly replaced by fine cirro-cumulus cloudlets which did not retain that form for more than a minute or two, but reverted to the general stratiform appearance. The forming of these turbulent areas appeared to the eye to resemble the "boiling" of eddies in water flowing past a rock where the water is rather deep. It is difficult to offer any suggestion of the causes of the phenomenon.

G.A.C.

CIRRO-CUMULUS, OBSERVED AT ABERDEEN, NOVEMBER 28TH, 1922.

Colombo Records for 1922.

FROM the Report on the Colombo Observatory for 1922 we learn that pilot balloon observations, at the rate of "three every third day" have become an important part of the routine of the observatory. The "Tail-method" is used. A survey of the results is to be published shortly. The same Report contains a valuable set of diagrams illustrating the diurnal variation of wind speed at Colombo. The contrast between the monsoonal type of a steady wind fluctuating between 10 miles an hour by night and 15 by day and the sea-breeze type which dies away at night is striking. The monsoon is strongest very soon after noon, but the sea-breeze culminates in the late afternoon. A tentative adaptation of the warm-front theory to explain the circumstances of a tropical rain storm is also interesting.

Radiation from the Sky

RADIATION MEASURED AT BENSON, OXON, 1923.

Unit: one gramme calorie per square centimetre per day.

ATMOSPHERIC RADIATION only (dark heat rays).

Averages for Readings about time of Sunset.

		July	Aug.	Sept.
Cloudless days:				
Number of readings	n	16	23	15
Radiation from sky in zenith ...	π I	626	564	547
Total radiation from sky ...	J	667	600	583
Total radiation from horizontal black surface on earth ...	X	830	763	746
Net radiation from earth ...	X—J	163	163	163

DIFFUSE SOLAR RADIATION (luminous rays).

Averages for Readings between 9 h. and 15 h. G.M.T.

Cloudless days:—				
Number of readings	n_0	3	6	4
Radiation from sky in zenith ...	πI_0	39	—	22
Total radiation from sky ...	J_0	40	—	25
Cloudy days:—				
Number of readings	n_1	5	3	4
Radiation from sky in zenith ...	πI_1	100	86	53
Total radiation from sky ...	J_1	88	61	50

Unit for I = gramme calorie per day per steradian per square centimetre.
Unit for J and X = gramme calorie per day per square centimetre.
For description of instrument and methods of observation, see *The Meteorological Magazine*, October, 1920, and May, 1921.

The Passing of Benson Observatory

WITH the transfer to Kew Observatory of the important work which has been carried on for many years at Benson, an interesting chapter in the history of the Meteorological Office is closed. The following statement which was issued to the newspapers at the end of September explains the circumstances.

In 1905 the Meteorological Office was for the first time able to assist the regular investigation of the Upper Air over the British Isles, which had previously been carried out by private scientific workers, in some cases with the assistance of the British Association for the Advancement of Science and of the Royal Meteorological Society. Mr. W. H. Dines, F.R.S. had taken a leading part in the practical development of the investigation, and, at the request of the Meteorological Office, he agreed to supervise their work for a nominal fee and provide free of charge the facilities which his residence afforded for work with kites and balloons. After 1910 Mr. Dines removed to Benson, in Oxfordshire, and for the past 12 years he has continued there the upper air work which he had carried out so successfully at Pyrton Hill, on the Chilterns, and at Oxshott, in Surrey, besides contributing meteorological reports daily in connection with the Forecast Service of the Meteorological Office. As a result of these investigations and of the research for which they provided material and in which Mr. Dines has himself taken a leading place, England gained a position in the forefront of the Investigation of the Upper Atmosphere.

At the end of June, 1922, Mr. Dines retired from active supervision of the work, and although he generously continued to give facilities for the investigations to be carried on at Benson, it became necessary to make arrangements for the permanent establishment of Upper Air Investigation. The pressing need for economy made it impossible to erect an observatory in the situation which Mr. Dines's experience had indicated to be the most desirable, viz., open country north-west of Oxford; it was accordingly arranged to utilise Kew Observatory, where some additional accommodation could be provided at small cost, and where the disadvantage of position would be to some extent compensated by proximity to the Central Office and contact with other branches of meteorological work. The provision of the accommodation is now practically complete and it is anticipated that the transfer will be made early in October. The Observatory at Benson will then be closed. The regular daily reports in connection with forecasting will be made at the Wireless Station at Leafield by the courtesy of the Postmaster-General, while the Upper Air Investigation will be continued at Kew Observatory.

News in Brief

IT is announced that Mr. G. M. B. Dobson has been awarded the Johnson Memorial Prize in the University of Oxford for his paper on "Measurements of the Sun's ultra-violet Radiation and its Absorption in the Earth's Atmosphere."* Mr. Dobson has developed a method for recording photographically the strength of such radiation coming from the sun as can pass through a thin film of silver. The fluctuations from day to day are found to be large, and their study opens up a new and important field of investigation for meteorologists.

AN account of the International Cloud Week, which was held during the week beginning September 24th, 1923, will be published in the November issue of this magazine.

The Weather of September, 1923

DURING the early part of the month fair, warm, sunny, weather prevailed generally in the more southerly districts of the British Isles. Maxima of 70° F. and over were recorded at several stations between the 6th and the 13th, 77° F. being reached in London on the 13th, and the sunshine records were above normal. In the north and west, however, the influence of the depressions passing from Iceland towards northern Norway was felt and several rather heavy falls of rain were recorded, *e.g.*, 36 mm. at Onich, 31 mm. at Ford on the 11th, and 33mm. at Stornaway on the 8th.

Towards the end of the second week the track of the depressions was more to the south and conditions became unsettled over the whole country. Strong or high winds were experienced on the western and northern coasts on the 11th and 12th, and then occurred almost daily from the 17th to the 26th on some or other exposed part of the coast, while gale force was reached on the 11th—12th, 17th, 20th—21st and 23rd—25th. Thunderstorms developed locally on the 14th and 15th and again on the 18th, 22nd and 23rd, and heavy rain was recorded from many places; 63 mm. at Bassett Down, Wilts, on the 14th and 57mm. at Dungeon Ghyll, Cumberland, being among the heaviest falls. The supply of "polar" air brought by northerly winds from the Icelandic region caused a decided drop in temperature on the 15th, and from then to almost the end of the month the weather was cool with maxima about 60° or even lower. Snow was reported for the first time this autumn, on the 20th on several of the mountains in Scotland.

Near the end of the month the anticyclone over France spread northwards and quiet, warm weather occurred generally over the

* Published in the Proc. Roy. Soc. Vol. 104 (series A) 923, p. 252.

British Isles, the highest temperatures of the month being recorded at several stations on the 30th. Much mist and fog prevailed during the last two days along the southern coasts of England and Ireland and resulted in many shipping accidents in the English Channel and St. George's Channel.

The heat and drought in Switzerland, referred to last month, continued through the first half of September, but on the 20th and after, several heavy snowfalls were reported, extending as low as 5,900 feet. In India the rains were generally heavy, especially at Bombay, which was flooded on the 20th and received a further 12 inches of rain in the week ending on the 27th, bringing the total fall during the season up to 77 inches, or 10 inches above normal. In the last week of September the monsoon weakened. In the United States snow and frost were recorded from an extensive area in the north and middle west as early as the 13th, and on the 27th the weakening of a bridge by heavy rainfall, in Wyoming, caused a serious rainfall accident.

Early in the month much fog was recorded, and on the 8th seven American destroyers went ashore in thick fog north of Santa Barbara, on the Pacific coast. The White Star liner "Majestic" was greatly delayed by fog between New York and Southampton.

The special message from Brazil states that in the north the rainfall averaged 23 mm. below normal. In the south the distribution was irregular, though 22 mm. more than normal were recorded, and in the central districts the rainfall was abundant, being 38 mm. above normal. Temperature was slightly above normal. Owing to these conditions the prospects of the coffee and sugar cane crops are not so good.

Mr. R. C. Mossman, Director of the Cordova Observatory, writes that in the Argentine the early days of September saw the termination of a period of unusually cold weather with strong southerly or westerly winds and much rain or snow. In some places in Central Argentine the snow, where not drifted, lay 3 or 4 feet deep, and enormous loss of sheep and cattle is reported; there was also an epidemic of influenza. This inclement weather was associated with an intense anticyclone (1,040 mb.) south of 50°S, with a deep, slow, moving depression south-east of Buenos Aires.

Rainfall September, 1923: General Distribution

England and Wales	126	per cent. of the average 1881-1915
Scotland	156	,, ,, ,,
Ireland	146	,, ,, ,,
British Isles	138	,, ,, ,,

Rainfall Table for September, 1923

CO.	STATION.	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent. of Av.
Lond.	Camden Square.....	1.29	33	71	*Leics*	Leicester Town Hall...	2·33	59	...
Sur .	Reigate, Hartswood...	1·60	41	...	,, .	Belvoir Castle.....	2·76	70	148
Kent.	Tenterden, View Tower	1·85	47	86	*Rut* .	Ridlington.....	2·86	73	...
,, .	Folkestone, Boro. San.	2·02	51	...	*Linc.*	Boston, Skirbeck	2·28	58	130
,, .	Broadstairs	1·59	40	81	,, .	Lincoln, Sessions House	2·37	60	154
,, .	Sevenoaks, Speldhurst.	1·56	40	...	,, .	Skegness, Estate Office.	2·82	72	156
Sus .	Patching Farm.....	2·26	57	94	,, .	Louth, Westgate	3·73	95	185
,, .	Eastbourne, Wilm. Sq.	3·38	86	135	,, .	Brigg	2·91	74	172
,, .	Tottingworth Park....	3·27	83	133	*Notts.*	Worksop, Hodsock....	2·21	56	145
Hants	Totland Bay, Aston...	3·15	80	141	*Derby*	Mickleover, Clyde Ho..	2·49	63	139
,, .	Fordingbridge, Oaklnds	2·35	60	109	,, .	Buxton, Devon. Hos...	6·01	153	185
,, .	Portsmouth, Vic. Park.	2·14	54	99	*Ches.*	Runcorn, Weston Pt...	3·60	91	135
,, .	Ovington Rectory	2·60	66	114	,, ..	Nantwich, Dorfold Hall	3·16	80	...
,, .	Grayshott	1·92	49	79	*Lancs*	Bolton, Queen's Park .	5·05	128	...
Berks	Wellington College...	1·74	44	95	,, ..	Stonyhurst College....	7·00	178	183
,, .	Newbury, Greenham..	1·98	50	98	,, ..	Southport, Hesketh...	3·57	91	130
Herts.	Bennington House....	...	..	...	,, ..	Lancaster, Strathspey.	4·07	103	...
Bucks	High Wycombe	2·42	61	128	*Yorks*	Sedbergh, Akay	7·95	202	189
Oxf..	Oxford, Mag. College..	2·00	51	119	,, .	Wath-upon-Dearne ...	1·24	31	78
Nor .	Pitsford, Sedgebrook..	2·60	66	144	,, .	Bradford, Lister Pk...	3·15	80	152
,, .	Eye, Northolm.....	2·60	66	...	,, .	Oughtershaw Hall	8·65	220	...
Beds.	Woburn, Crawley Mill.	2·67	68	140	,, .	Wetherby, Ribston H..	2·68	68	149
Cam.	Cambridge, Bot. Gdns.	1·97	50	122	*ERY*	Hull, Pearson Park ...	3·25	83	189
Essex	Chelmsford, CountyLab	1·84	47	...	,, .	Holme-on-Spalding ...	3·20	81	...
,, .	Lexden, Hill House...	1·28	33	...	,, .	Lowthorpe, The Elms.	2·06	52	119
Suff.	Hawkedon Rectory ...	3·04	77	157	*NRY*	West Witton, Ivy Ho..	2·76	70	...
,, .	Haughley House.....	1·64	42	...	,, .	Pickering, Hungate ...	3·01	77	...
Norf.	Beccles, Geldeston....	1·23	31	64	,, .	Middlesbrough	1·56	40	94
,, .	Norwich, Eaton	1·95	49	91	,, .	Baldersdale, Hury Res.	2·76	70	101
,, .	Blakeney	1·43	36	77	*Durh.*	Ushaw College	1·33	34	66
,, .	Swaffham	1·85	47	87	*Nor* .	Newcastle, Town Moor.	1·78	45	87
Wilts.	Devizes, Highclere....	4·23	107	...	,, .	Bellingham Manor....	2·66	68	...
Dor .	Evershot, Melbury Ho.	4·17	106	157	,, .	Lilburn Tower Gdns...	1·91	49	...
,, .	Weymouth, Westham..	3·26	83	155	*Cumb*	Penrith, Newton Rigg..	...	...	...
,, .	Shaftesbury, Abbey Ho.	2·87	73	118	,, .	Carlisle, Scaleby Hall .	3·43	87	127
Devon	Plymouth, The Hoe...	3·00	76	122	,, .	Seathwaite	13·35	339	135
,, .	Polapit Tamar	3·47	88	124	*Glam.*	Cardiff, Ely P. Stn....	4·02	102	130
,, .	Ashburton, Druid Ho..	4·96	126	159	,, .	Treherbert, Tynywaun	8·48	215	...
,, .	Cullompton	2·96	75	132	*Carm*	Carmarthen Friary....	4·42	112	128
,, .	Sidmouth, Sidmount ..	2·79	71	121	,, .	Llanwrda, Dolaucothy.	6·34	161	156
,, .	Filleigh, Castle Hill ...	4·76	121	...	*Pemb*	Haverfordwest, Portf'd	3·56	90	100
,, .	Hartland Abbey.....	3·16	80	...	*Card.*	Gogerddan.....	...	..	...
Corn.	Redruth, Trewirgie	3·24	82	104	,, .	Cardigan, County Sch. .	3·44	87	...
,, .	Penzance, Morrab Gdn.	2·80	71	96	*Brec* .	Crickhowell, Talymaes	8·00	203	...
,, .	St. Austell, Trevarna..	3·78	96	119	*Rad* .	Birm.W.W.Tyrmynydd	5·27	134	137
Som	Street, Hind Hayes ...	2·99	76	...	*Mont.*	Lake Vyrnwy	5·62	143	159
Glos..	Clifton College	3·05	77	130	*Denb.*	Llangynhafal	2·93	74	...
,, .	Cirencester	2·83	72	125	*Mer* .	Dolgelly, Bryntirion..	8·48	215	199
Here.	Ross, County Obsy. ...	2·16	55	107	*Carn.*	Llandudno	3·02	77	132
,, .	Ledbury, Underdown.	1·86	47	97	,, .	Snowdon, L. Llydaw 9	18·30	465	...
Salop	Church Stretton.....	2·74	70	135	*Ang* .	Holyhead, Salt Island.	3·96	101	148
,, .	Shifnal, Hatton Grange	2·07	53	107	,, .	Lligwy	3·55	90	...
Staff.	Tean, The Heath Ho...	3·82	97	160	*Man.*	Douglas, Boro' Cem...	4·05	103	123
Worc.	Ombersley, Holt Lock.	1·67	42	94	*Guer.*	St. Peter Port, Grange.	3·15	80	121
,, .	Blockley, Upton Wold.	2·49	63	119	*Wigt.*	Stoneykirk, Ardwell Ho	3·95	100	142
War	Farnborough.....	2·73	69	128	,, .	Pt. William, Monreith .	4·04	103	...
,, .	Birminghm, Edgbaston	2·69	69	150	*Kirk.*	Carsphairn, Shiel.	10·63	270	...

Correction—Cardiff, Ely P. Stn., Aug., *for* 4·61 | 117 | 107 | *read* 4·91 | 125 | 114

Rainfall Table for September, 1923—*continued*

CO.	STATION.	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm	Per-cent. of Av.
Kirk.	Dumfries, Cargen	6·52	166	222	*Caith*	Loch More, Achfary	9·30	236	162
Dum	Drumlanrig	5·85	149	198	„ ..	Wick	3·34	85	134
Roxb	Branxholme	3·54	90	158	*Ork .*	Pomona, Deerness	5·41	137	187
Selk .	Ettrick Manse	6·79	173	...	*Shet .*	Lerwick	5·84	148	194
Berk.	Marchmont House	1·71	43	71	*Cork.*	Caheragh Rectory	6·33	161	...
Hadd	North Berwick Res.	2·29	58	110	„ ..	Dunmanway Rectory	5·51	140	134
Midl	Edinburgh, Roy. Obs.	1·60	41	87	„ ..	Ballinacurra	2·57	65	102
Lan .	Biggar	4·29	109	188	„ ..	Glanmire, Lota Lo.	3·31	84	118
Ayr .	Kilmarnock, Agric. C.	6·17	157	202	*Kerry*	Valencia Obsy.	5·62	143	136
„ .	Girvan, Pinmore	6·87	175	179	„ .	Gearahameen	12·00	305	...
Renf.	Glasgow, Queen's Pk.	5·79	147	209	„ .	Killarney Asylum	6·76	172	189
„ .	Greenock, Prospect H.	11·67	296	246	„ .	Darrynane Abbey	4·10	104	115
Bute.	Rothesay, Ardencraig	8·23	209	203	*Wat .*	Waterford, Brook Lo.	3·09	79	112
„ .	Dougarie Lodge	7·19	183	...	*Tip .*	Nenagh, Cas. Lough	3·39	86	121
Arg .	Glen Etive	14·83	377	...	„ .	Tipperary	3·77	96	...
„ .	Oban	8·27	210	...	„ .	Cashel, Ballinamona	3·60	91	147
„ .	Poltalloch	9·70	246	213	*Lim .*	Foynes, Coolnanes	3·50	89	125
„ .	Inveraray Castle	13·44	341	209	„ .	Castleconnell Rec.	4·10	104	...
„ .	Islay, Eallabus	9·54	242	228	*Clare*	Inagh, Mount Callan	7·76	197	...
„ .	Mull, Benmore	24·40	620	...	„ .	Broadford, Hurdlest'n.	5·32	135	...
„ .	Mull, Quinish	...	..	...	*Wexf*	Newtownbarry	3·27	83	...
Kinr.	Loch Leven Sluice	3·37	86	131	„ .	Gorey, Courtown Ho.	2·34	59	95
Perth	Loch Dhu	11·30	287	197	*Kilk.*	Kilkenny Castle	2·26	57	98
„ ..	Balquhidder, Stronvar.	10·12	257	190	*Wic .*	Rathnew, Clonmannon	1·83	47	...
„ ..	Crieff, Strathearn Hyd.	4·05	103	142	*Cars .*	Hacketstown Rectory	3·39	86	121
„ ..	Blair Castle Gardens	3·15	80	...	*QCo..*	Blandsford House	...	..	...
„ .	Coupar Angus School	2·78	71	140	„	Mountmellick	3·49	89	...
Forf.	Dundee, E. Necropolis	2·40	61	115	*KCo.*	Birr Castle	3·35	85	146
„ .	Pearsie House	3·65	93	...	„ .	Ballycumber, Bellair	3·10	79	...
„ .	Montrose, Sunnyside	2·40	61	121	*Dubl.*	Dublin, FitzWm. Sq.	1·83	47	95
Aber.	Braemar Bank	3·43	87	136	„ .	Balbriggan, Ardgillan	2·68	68	131
„ .	Logie Coldstone Sch.	2·34	59	100	*Me'th*	Drogheda, Mornington	2·88	73	...
„ .	Aberdeen, Cranford Ho	3·85	98	165	*W.M*	Mullingar, Belvedere	3·53	90	132
„ .	Fyvie Castle	2·02	51	...	*Long*	Castle Forbes Gdns.	4·03	102	140
Mor .	Gordon Castle	3·13	79	125	*Gal .*	Galway, Waterdale	4·13	105	...
„	Grantown-on-Spey	2·15	55	87	*Mayo*	Crossmolina, Enniscoe	8·15	207	208
Na .	Nairn, Delnies	2·52	64	115	„ .	Mallaranny	9·72	247	...
Inv..	Ben Alder Lodge	4·57	116	...	„ .	Westport House	6·90	175	194
„ .	Kingussie, The Birches	2·59	66	...	„ .	Delphi Lodge	14·93	379	...
„ .	Fort Augustus	...	..	...	*Sligo*	Markree Obsy.	6·18	157	182
„ .	Loch Quoich, Loan	...	..	...	*Ferm*	Enniskillen, Portora	4·96	126	...
„ .	Glenquoich	...	..	...	*Arm.*	Armagh Obsy.	3·47	88	141
„ .	Inverness, Culduthel R.	1·77	45	...	*Down*	Warrenpoint	3·35	85	...
„ .	Arisaig, Faire-na-Squir	10·12	257	...	„ .	Seaforde	4·89	124	178
„ .	Fort William	10·90	277	174	„ .	Donaghadee	3·67	93	154
„ .	Skye, Dunvegan	7·72	196	...	„ .	Banbridge, Milltown	3·37	86	137
„ .	Barra, Castlebay	4·33	110	...	*Antr.*	Belfast, Cavehill Rd.	4·50	114	...
R&C	Alness, Ardross Cas.	2·83	72	97	„ .	Glenarm Castle	5·57	141	...
„ .	Ullapool	5·42	138	...	„ .	Ballymena, Harryville	5·07	129	163
„ .	Torridon, Bendamph.	8·94	227	129	*Lon .*	Londonderry, Creggan	5·76	146	175
„ .	L. Carron, Plockton	6·40	163	...	*Tyr .*	Donaghmore	4·74	120	...
„ .	Stornoway	4·94	126	125	„ .	Omagh, Edenfel	5·12	130	168
Suth.	Dunrobin Castle	...	..	...	*Don .*	Malin Head	4·60	117	176
„ .	Lairg	3·55	90	...	„ .	Letterkenny Hospital	6·10	155	179
„ .	Forsinard	...	..	...	„ .	Dunfanaghy	5·52	140	160
„ .	Tongue Manse	3·35	85	106	„ .	Narin, Kiltoorish	6·34	161	...
„ .	Melvich School	3·96	101	141	„ .	Killybegs, Rockmount	9·02	229	196

Climatological Table for the British Empire, April, 1923

STATIONS	PRESSURE		TEMPERATURE							Relative Humidity	Mean Cloud Am'nt	PRECIPITATION			BRIGHT SUNSHINE	
			Absolute		Mean Values				Mean							
	Mean of Day M.S.L.	Diff. from Normal	Max.	Min.	Max.	Min.	½ max. and min.	Diff. from Normal	Wet Bulb.			Am'nt	Diff. from Normal	Days	Hours per day	Percentage of possible.
	mb.	mb.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	%	0—10	mm.	mm.			
London, Kew Obsy.	1008·0	— 6·4	64	32	54·7	41·1	47·9	+ 0·6	44·2	75	6·8	40	+ 3	12	4·0	29
Gibraltar	1013·6	— 1·7	71	46	64·1	52·0	58·1	— 2·7	54·2	78	5·8	191	+123	18	...	...
Malta	1013·0	+ 0·5	78	49	64·6	55·4	60·0	+ 0·3	55·1	77	5·0	29	+ 9	7	7·1	54
Sierra Leone	1011·0	0·0	93	72	87·8	75·9	81·9	— 0·9	76·1	74	7·1	131	+ 28	12	...	...
Lagos, Nigeria	1009·8	0·0	90	71	87·7	76·0	81·9	— 0·4	78·1	75	6·6	163	+ 14	14	...	...
Kaduna, Nigeria	1011·9	+ 1·2	95	66	90·2	70·8	80·5	— 2·0	70·6	61	0·7	142	+ 74	11	...	...
Zomba, Nyasaland	1012·0	+ 0·1	83	55	78·3	61·2	69·7	+ 0·4	...	87	6·3	57	— 48	15	...	...
Salisbury, Rhodesia	1012·1	— 2·3	88	47	80·2	53·6	66·9	+ 1·0	59·9	69	2·9	35	+ 9	4	...	...
Cape Town	1016·5	+ 0·2	98	46	71·9	55·3	63·6	+ 0·5	58·8	70	5·1	69	+ 18	10	...	...
Johannesburg	1016·6	— 0·3	76	30	69·4	49·7	59·5	— 0·1	50·6	69	3·3	40	— 12	7	8·4	74
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bloemfontein	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Calcutta, Alipore Obsy.	1004·8	— 1·5	101	68	94·9	77·0	85·9	+ 0·2	76·6	74	4·3	21	— 23	*1	...	...
Bombay	1007·6	— 1·0	93	76	89·9	77·7	83·8	+ 0·7	74·9	72	2·6	1	— 1	*0	...	...
Madras	1006·5	— 1·9	103	72	93·9	77·9	85·9	+ 0·6	78·6	68	3·7	0	— 15	*0	...	...
Colombo, Ceylon	1007·8	— 1·3	92	73	90·0	75·7	82·9	+ 0·2	79·2	66	6·0	190	— 62	13	7·8	63
Hong Kong	1012·0	— 0·6	83	65	76·1	68·6	72·3	+ 1·4	68·5	85	7·7	213	+ 73	13	4·3	34
Sandakan	...	...	89	73	87·0	75·8	81·4	— 0·8	†76·9	†81	...	250	+144	16	...	...
Sydney	1023·3	+ 4·9	77	52	71·1	58·7	64·9	+ 0·3	60·1	74	5·7	240	+102	23	4·6	41
Melbourne	1024·4	+ 5·0	87	39	72·5	49·6	61·1	+ 1·6	55·8	62	3·0	0	— 57	0	6·2	56
Adelaide	1021·7	+ 1·9	91	50	81·3	58·8	70·1	+ 6·3	56·8	39	3·1	1	— 45	1	7·8	70
Perth, W. Australia	1016·4	— 2·0	90	51	78·0	59·8	68·9	+ 2·5	60·8	59	5·0	56	+ 15	8	7·1	63
Coolgardie	1017·7	— 0·8	95	51	77·6	57·6	67·6	+ 2·5	60·9	55	6·9	27	+ 3	9	...	...
Brisbane	1018·1	+ 0·7	85	57	76·1	61·7	68·9	— 1·5	64·8	72	6·3	147	+ 56	19	5·4	47
Hobart, Tasmania	1026·7	+12·2	77	40	63·3	47·9	55·6	+ 0·5	50·9	71	5·8	3	— 45	7	5·5	50
Wellington, N.Z.	1022·8	+ 5·0	71	36	62·8	46·6	54·7	— 2·1	50·0	71	5·6	78	— 21	12	5·9	53
Suva, Fiji	1011·4	+ 0·8	87	70	83·0	73·1	78·1	— 0·6	75·6	88	6·2	161	—126	18	...	...
Kingston, Jamaica	1014·3	0·0	90	66	87·3	69·4	78·3	— 0·1	...	71	4·1	23	— 8	8	...	...
Grenada, W.I.	1014·3	+ 1·7	85	70	83·4	72·5	77·9	— 0·9	72·4	71	5·0	46	— 14	12	...	...
Toronto	1014·0	— 1·5	81	5	51·1	33·9	42·5	+ 1·1	37·0	71	5·1	59	— 2	14	...	...
Winnipeg	1015·3	— 1·7	72	— 9	45·1	23·1	34·1	— 3·7	30·7	71	2·9	19	— 19	6	...	...
St. John, N.B.	1012·2	— 1·4	63	7	42·4	29·2	35·8	— 3·2	33·0	78	6·2	127	+ 38	13	...	...
Victoria, B.C.	1015·1	— 2·2	70	39	55·6	42·6	49·1	+ 1·4	45·1	80	5·6	18	— 26	10	...	...

* For Indian stations a rain day is a day on which 0·1 in. (2·5 mm.) or more rain has fallen. † Mean of observations at 9h., 15h., 21h., from April, 1923.

Winnipeg	1015·3	— 1·7	72	— 9	45·1	23·1	34·1	— 3·7	30·7	71	2·9	19	— 19	6	...	...
St. John, N.B.	1012·2	— 1·4	63	7	42·4	29·2	35·8	— 3·2	33·0	78	6·2	127	+ 38	13	...	...
Victoria, B.C.	1015·1	— 2·2	70	39	55·6	42·6	49·1	+ 1·4	45·1	80	5·6	18	— 26	10	...	...

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